NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

INSPECTION, SAMPLING AND TESTING OF SODIUM CHLORIDE CRUSHED ROCK SALT, TYPE A

I. SCOPE

This Materials Method describes specific quality assurance procedures for the control of sodium chloride, Type A, crushed rock salt used for ice and snow removal In addition, a case method approach is presented to illustrate the desired sampling rates and to determine the quantity of material to be involved in any rebate determination(s). Instructions for properly completing the history of each sample or lot on a direct keypunch data form are presented in detail in Appendix A. Also, procedures for obtaining representative salt samples and for performing laboratory testing are presented in Appendices B and C respectively.

II. DEFINITIONS

1. SUPPLIER

A company or individual to whom the contract or a portion thereof, has been awarded, for sodium chloride crushed rock salt, Type A.

2. DEPARTMENT

The New York State Department of Transportation.

3. HIGHWAY MAINTENANCE SUBDIVISION

A facility of the New York State Department of Transportation which may be contacted by mailing to:

George M. Briggs
Director, Highway Maintenance Subdivision
The State Campus - Bldg. #5
1220 Washington Avenue
Albany, New York 12226

or by telephoning the Highway Maintenance Subdivision at Area Code 518 - Number 457-6435 or T.W.X. to:

710-441-8221
NYSDOT Albany Campus
Highway Maintenance Subdivision

4. REGION OR REGIONAL OFFICE

One of ten subdivisions of the New York State Department of Transportation, under the direction of an individual entitled the Regional Director.

5. REGIONAL MAINTENANCE ENGINEER

An individual, employed with a particular region, whose primary responsibility is to maintain the State's highway system.

6. RESIDENT ENGINEER

An individual, responsible to the Regional Maintenance Engineer, whose responsibility is to maintain the State's highway system within the particular counties of the State of New York.

7. MATERIALS BUREAU

A facility of the New York State Department of Transportation which may be contacted by mailing to:

Harry H. McLean
Director of Engineering Materials
The State Campus - Bldg. #7
1220 Washington Avenue
Albany, New York 12226

or by telephoning the Product Control Office at Area Code 518-Number 457-5642 or T.W.X. to:

710-441-8821
NYSDOT Albany Campus
Materials Bureau

8. STOCKPILE, DEPARTMENT

A supply or reserve of salt delivered to the destination points prescribed in the contract proposal.

9. STOCKPILE, SUPPLIER

A large supply or reserve of salt, stocked by a supplier at various locations throughout the State, for the purpose of assuring the fulfillment of his contract obligations.

10. LOT

A quantity of salt, used by the Department for the purpose of accepting, rejecting or applying rebate penalties to delivered salt. This quantity may involve a whole order or a portion thereof.

11. TRUCK SAMPLE

A small quantity of salt, properly taken from a truck delivery, which will be representative of the entire truckload.

12. STOCKPILE SAMPLE

A small quantity of salt, properly taken from a stockpile, which will be representative of the entire stockpile or a portion thereof.

NYSDOT
Library
50 Wolf Road, POD 34
Albany, New York 12232

13. FORMS

The following forms are published and issued, by the Department, for use by their designated representatives.

a. R-243 Salt Sampling Record - This form accompanies the salt sample through the various stages and is completed by the individuals responsible for the sampling, testing and documentation. Detailed instructions for proper completion are contained in Appendix A.

b. R-244 Salt Delivery Record - This form is for use in the Residency Office for recording all salt deliveries and samples within a residency. Detailed instructions for proper completion are contained in Appendix A.

III. SAMPLING

This section is intended to outline the sampling that should be performed under varying conditions and at different locations. The first part of this section describes the general policy for sampling and the second part gives example cases.

1. General Policy

Any sampling process encompassess four factors: a.) The rate at which samples should be taken. b.) Where the samples should be taken. c.) When the samples should be taken and d.) how the samples should be taken.

The rate at which samples are taken is primarily determined by how accurate the answer must be to make the required decision. The sampling rate for rock salt can be viewed from two different levels: a.) The Statewide or region rate, expressed as sample per ton. This rate controls the maximum effort devoted to the task. b.) The residency or Department Stockpile Rate.

This rate is described via a case method approach to fit individual situations. Ideally, by applying the individual approaches at the residency level, each region will develop the same region sampling rate.

The minimum Statewide or region sampling rate should be one sample per 500 tons of delivered salt. This rate represents a reasonable value in terms of the protection it offers the State in buying rock salt. As mentioned above, this rate is of value only in monitoring the overall region and Statewide effort. A higher sample rate would be taken in cases where the material being delivered did not appear to meet specifications.

Where the samples are taken depends on the product and the process. In the case of rock salt, since the delivery process can be a vital factor in determining the quality of the product, it is generally desirable to sample at the delivery destination.

When the sample is taken is generally influenced by the practical aspects of the sampling situation. The sample should be taken from the Department stockpile immediately after completion of the days delivery or within 24 hours. If this is not practical, samples may be taken from the delivery vehicle before it unloads or while it is unloading.

How to sample bulk products, such as rock salt, is a difficult procedure. However, it is important that the procedures outlined in this Materials Method be followed closely to insure that truly representative samples are taken.

2. Case Method Approach

The following examples are intended to describe the desired sampling plans, in terms of practical situations.

Example 1: A stockpile location remote from the Residency, 300 tons of rock salt is ordered and will be delivered in one day. The weather is good with no precipitation, and the stockpile is either placed in a storage shed or covered as soon as it is completed. If personnel were available on this day the sample could be taken from the stockpile after completion of the delivery. If personnel are not available until after the stockpile is complete, the pile can be sampled after it has been built and within a 24 hour period after the last truck load has been delivered, so long as the pile remains adequately protected. The sample taken represents the entire stockpile quantity. Any necessary rebate action shall be applied to the entire stockpile quantity.

Example 2: The same as example 1 except that it is impossible to sample either the trucks or the pile until four days after it was built. The pile may be sampled if so desired, but no rebate action can be based on the test results since it is no longer reasonable to presume that the sample is representative of what was delivered, as more than 24 hours has elapsed since the last truck load was delivered.

Example 3: Same as example 1 except that material is being delivered during precipitation and it is impractical to obtain a representative stockpile sample. Truck samples may be taken. If any of these samples fail, any penalties occurring may only be applied to the truck loads from which the failing samples were taken.

Example 4: A large stockpile, 5000 tons, is being built at a Residency location. It takes 10 days to build the pile. There are two ways to sample in this situation: a.) each days addition to the stockpile could be sampled from the exposed faces as a stockpile, and b.) the entire stockpile could be sampled after completion.

Method b.) is the least desirable method since it depends upon good weather prevailing during the buildup period and good covering practice being maintained. If this option is elected, the rebate action is only applied to the quantity of salt delivered on the tenth day. If option a.) is elected, the rebate action is applied to the quantity of material which was delivered on the day the sample was taken.

IV. FORMS DISTRIBUTION (SALT SAMPLING RECORD)

1. SCOPE

This section describes the procedure to be taken by Regional Maintenance personnel for the processing and distribution of the Salt Sampling Record form. Information on proper completion of the form is contained in Appendix A - Forms Instruction.

2. DISTRIBUTION

After the Region Control Information section of the Salt Sampling Record form is completed, the Regional Maintenance Engineer shall distribute the form as follows:

a. The original and pink copy shall be forwarded to the Main Office, Highway Maintenance Subdivision.

b. The yellow copy shall be maintained at the Regional Maintenance level. If the supplier requests a copy of the test results, a copy may be made and forwarded to the supplier.

APPENDIX A

FORMS INSTRUCTIONS

The Salt Sampling Record is printed on a three part pressure sensitive paper. Several individuals or offices are involved in the processing of the Salt Sampling Record form. To help clarify the portion of the form that each of the parties involved are responsible for, it has been divided into five sections. The sections and the procedure for completing them are listed below:

1. The SAMPLE INFORMATION section will be filled in by the sampler as described herein and the sample and form forwarded to the Residency Office.

2. The RESIDENCY CONTROL INFORMATION will be entered utilizing the R-244 Salt Delivery Record form described in these instructions. The sample and form are transmitted to the Region Materials Office.

3. The Region Materials Office performs the test, completes the test information section and forwards the form to Regional Maintenance Office.

4. The Regional Control Information section is then completed and the white and pink copies are transmitted to the Main Office. The yellow copy is filed and maintained at the Regional Maintenance level.

5. The Main Office will enter the Record Number and process the form.

The following are explanations of each section of the form and each entry in the section and how they are to be completed. The "CODE LIST" mentioned will be distributed after the contract has been let and locations and prices have been established.

SAMPLE INFORMATION

Region - 1 digit, Region 10 = 0
Residency - Residency responsible for location.
Delivery Location - Department stockpile where the sample is taken. When State truck picks up salt at suppliers stockpile, list Department stockpile destination of truck.
Sample Date - Date of sampling
EXAMPLE: Sept. 8, 1971 - [0][9][0][8][7][1]
Sample Type - Enter either 1 for stockpile or
2 for truck sample.
Truck Net Wt. - Enter weight of salt in pounds, if sampling a truck, otherwise leave blank.
Sample Number - Order of sampling for that date in that location, first sample of the day will be [0][1].
Supplier - Name of Supplier. A note should also be entered if the sample is not taken at a delivery location. This would be the case if sampling a State truck as it was picking up at the suppliers stockpile or if the suppliers stockpile was being tested.

RESIDENCY CONTROL INFORMATION

Residency Office - Where the information is being entered.
Recorded by - Name of person making the entries.
Date - Date the form is being filled out.
Residency - 2 digit code commonly used by DOT for identifying each residency - list will be distributed by M.O. (see "Code List").

Example: Oneida, East = [2][6]
Ontario = [4][5]
Nassau and Suffolk, West = [0][1]

Delivery Location - 2 digit code (see "Code List") assigned by M.O. indentifying each DOT Stockpile (Delivery) location listed in the salt contract. If you have a location which is not listed, notify the M.O. immediately for a code to be assigned.
Bid Price Per Ton - included on above list (see "Code List").
Example: $14.25 per ton = $[1][4][2][5]

Total Delivery Quantity (Tons) - Total Quantity Ordered this time for this location.

Quantity Received Since Last Sample (Tons) - How much salt has been delivered to this location since last sample was taken. For first sample this will equal Total Quantity Received to Sample Date. For rest of samples, this will equal the difference between total Quantity of Last Sample and Total Quantity to date.

Total Quantity Received to Sample Date (Tons) - Total number of tons of salt delivered to loaction as of the date the sample was taken - EX: 800 tons = |0|0|8|0|0|.

Sequence Number - Number of samples to date at delivery location - 1st sample = |0|0|1|.

Supplier - 1 digit code (see "Code List ") identifying supplier.

Suppliers Invoice No. - should be included on the delivery ticket. Please report if possible.

Suppliers Order No. - should also be included on the delivery ticket. It is not used by all manufacturers, but should be reported if it exists.

Invoice Date - date of suppliers invoice.

D.O.T. Order No. - D.O.T. order number.

Ticket Numbers - must be reported - when sample represents more than one truckload, list numbers of all tickets or trucks represented - if single truck sample list that number.

TEST INFORMATION

Test Date - date sample is tested. - Example: Sept. 9, 1971 = |0|9|0|9|7|1|.

Tester - Name of person performing test and numeric code which will be assigned to each tester by the Region Materials Lab supervisor. Each tester will be identified by one code number only.

Example: W. Salty |0|1|

Moisture Test - A. Initial Weight, specify unit (grams, pounds, etc.)
B. Dry Weight
C. Difference (A-B)

Moisture content equals difference (C) divided by intial weight (A) and multiplied by 100 to obtain percent. Percent is reported to nearest .1%.

EXAMPLE OF TEST SECTION

TEST DATE [0|9] [0|9] [7|1] (Month Day Year) TESTER W. Salty TESTER CODE [0|1]

MOISTURE TEST: SPECIFICATION - MAXIMUM 2.0%

A.	INITIAL WEIGHT OF SAMPLE	1228
B.	WEIGHT AFTER DRYING	1203
C.	DIFFERENCE (A-B)	25

MOISTURE CONTENT = $\frac{C}{A}$ x 100 = [2.0] %

PASS = 1
FAIL = 0 [1]

INFORMATION

GRADATION TEST: PASS = 1
FAIL - 0 [0]

TEST SIEVE	WEIGHT RETAINED	INDIVIDUAL % RETAINED	CUMULATIVE % RETAINED	CUMULATIVE % PASSING (100-CUM. % RET.)	ROUNDED % PASSING (ASTM E-29)	SPECIFICATION RANGE (CUM. % PASS.)	% OUT OF SPECIFICATION
3/8"	29	5.8	5.8	94.2	94	95-100	1
No. 4	154	30.8	36.6	63.4	63	75-100	12
No. 8	199	39.8	76.4	23.6	24	0-55	0
No. 30	113	22.6	99.0	1.0	01	0-15	0
PAN	5	1.0	100.0	0			
TOTAL	500.0	100.0					13

Information for samples failing moisture and/or gradation:

A.	Total Moisture content if greater than 2.0%	0.0%
B.	Total % out of specification if failing gradation	13%
C.	Total % of rebate (Sum of A+B)	13.0

For gradation test, all rounding is done according to ASTM E-29.
Bottom of this section is completed for all failing samples.

REGIONAL CONTROL INFORMATION

Rebate Quantity - This information will be maintained at the Residency Office. Upon receipt of the Salt Sampling Record, the Regional Maintenance Office will contact the Residency Office, inform them of the test results, obtain and enter the rebate quantity.

Sampler Code - A list of 2 digit numeric codes for samplers will be maintained at the Region and entered in the assigned boxes on the SALT SAMPLING RECORD. This will provide a unique numeric code for each sampler in an entire region.

SALT DELIVERY RECORD (R-244)

Salt Delivery Record is to be completed at the Residency Office. Each Department Stockpile location will require a separate sheet. For each location, an original and two carbon copies should be maintained. At the end of the season, one copy will be retained at the residency and the other two copies transmitted to the Main Office.

A description of the entries is given in the Salt Sampling Record Section of this Appendix. The Cumulative Quantity is the sum of all the Delivery Quantities to date. The Quantity Received Since Last Sample is arrived at by subtracting the current Cumulative Quantity from the Cumulative Quantity at the last sample date.

The Rebate Quantity is computed by following the explanation given in Materials Method N.Y. 22.

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SALT DELIVERY RECORD

Page ____ Of ____

DELIVERY LOCATION		CODE	RESIDENCY		CODE
SUPPLIER	F.O.B. PLANT COST $ ____ . ____ Per Ton	CODE	SUPPLIER	DELIVERED COST $ ____ . ____ Per Ton	CODE

TO BE COMPLETED FOR ALL DELIVERIES								TO BE COMPLETED WHEN SAMPLED				
Delivery Date	Invoice Date	Supplier Invoice No.	Supplier Order No.	Ticket No.(s)	DoT Purchase Order No.	Delivery Quantity	Cumulative Quantity	Quantity Received Since Last Sample	Sequence No.	Rebate Quantity	Moisture Failure	Gradation Failure

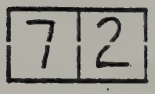
HOW TO FORM NUMBERS

CORRECT	INCORRECT
0	6, 0
1	1, 1
2	2
3	3
4	4

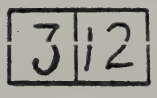
CORRECT	INCORRECT
5	5, 5
6	6
7	7
8	8, 8
9	9

HOW TO MAKE NUMERIC ENTRIES IN CODING BOXES

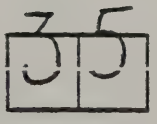
CORRECT



INCORRECT



or



Only 1 number per box is permitted

Keep numbers entirely within the Coding Box

RULES TO FOLLOW FOR ALL CODING

1. All data entered on forms must be printed
2. Use pencil to make entires on Coding Forms
3. Only UPPER CASE letters are permitted
4. Keep all entries within the intended boxes
5. If an erasure is necessary, completely erase the original entry and make the new entry
6. Make sure that all forms are completely filled out in the manner prescribed in the instructions

APPENDIX B
SAMPLING PROCEDURES
SODIUM CHLORIDE CRUSHED ROCK SALT - TYPE A

I. SCOPE

The importance of proper salt sampling from the standpoint of quality control and acceptance cannot be overemphasized. It is the intent of this section to prescribe procedures for obtaining salt samples that will be representative of a lot, or portion thereof, for the purposes of accepting, rejecting or applying rebate penalties to delivered salt. Methods for obtaining samples from both truck shipments and stockpiles are presented.

II. GENERAL

Only samples of delivered salt, which will be used to build the Department's stockpile, will be used in rebate determinations. The sample may be, as described herein, a truck sample taken prior to discharge; a truck sample at the point of discharge or a Department stockpile sample. Department stockpile samples are preferable to the other sampling methods. There may be some instances when a sample may be taken at the suppliers stockpile. This may occur when Department vehicles pick up salt at the suppliers stockpile for immediate use or when a supplier requests that his stockpile be sampled. When the former occurs, a sample may be taken from the suppliers stockpile and will be considered as representative of the lot, or portion thereof, for the purposes of rebate determinations. When the latter occurs (supplier requests that his pile be sampled) the sample will be considered as being for informational purposes only. Suppliers requesting that their stockpiles be sampled should be given as much cooperation as is practicable.

III. SAMPLING PROCEDURES

1. TRUCK SAMPLES

A. Prior to Discharge

Preferably, truck samples shall be taken prior to discharge. As the salt is delivered, it has generally become segregated while it has been loaded in the body. This segregation occurs as illustrated in Figure 1.

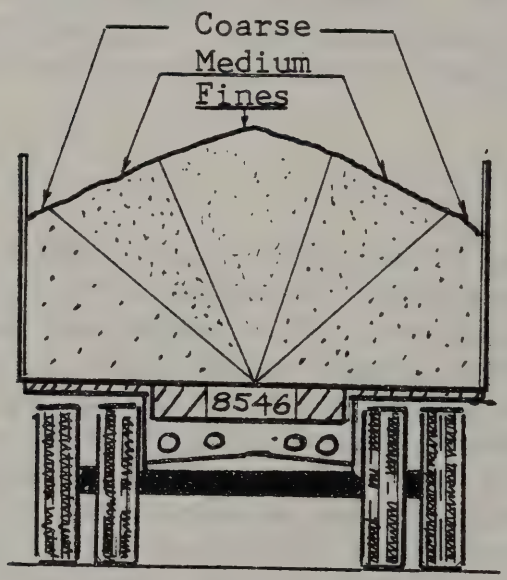


Figure 1 - Salt Segregation in Truck Shipment

To insure that a representative sample of salt is obtained, two (2) trenches, approximately one foot (1') deep should be dug, perpendicular to the length of the body and approximately at the 1/3 positions. Five samples should be removed, from each trench, as illustrated in Figure 2, and at the location indicated for a total sample weighing approximately ten (10) pounds.

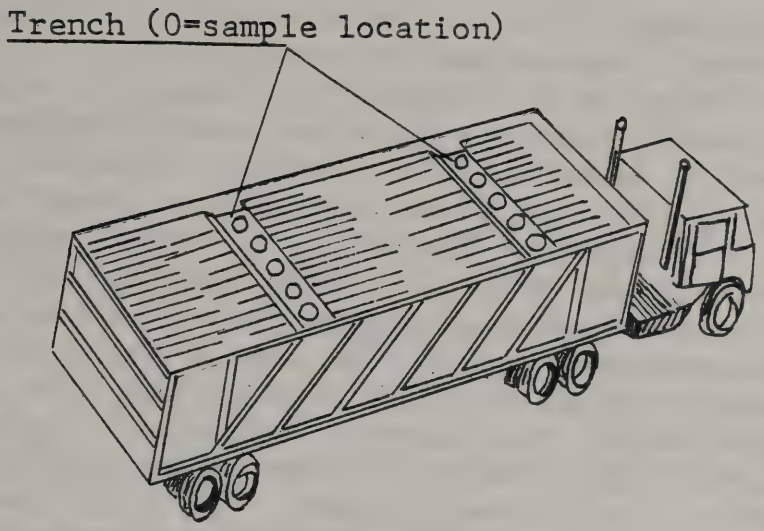


Figure 2 - Sample Locations from Truck Shipment

All samples of salt should be removed from each location with a shovel. No cans or other "makeshift" devices, which may contaminate the salt should be used. If sampling thiefs or scoops, specifically designed for the purpose of obtaining aggregate samples are available, they may be utilized. The samples shall be immediately placed in an airtight* plastic bag, the top twisted, and a "tie" attached.

* The recommended plastic bag is of the 11 x 21", polyvinyl type.

The fact that a sample has been taken should be noted on the delivery ticket, the necessary information entered on the R-243 Salt Sampling Record at the site and transmitted with the sample to the Residency Office. As soon as possible (preferably within 24 hours) the sample, together with the necessary form, should be transmitted to the Regional Office for testing.

B. Sampling at Point of Discharge

Although it is not recommended, if it proves necessary, samples may be obtained while the truck is discharging or "dumping" its load. A total of 5 increment samples should be taken throughout the unloading operation with a shovel or bucket. The total of the 5 increment sample size should approximate 5-10 pounds. The shovel or bucket should be passed through the salt stream, and at such times during the unloading process, so as to insure a representative sample. The sample shall be immediately placed in the plastic bag, the top twisted and a "tie" used to insure air-tightness. The fact that a sample has been taken should be noted on the delivery ticket. The R-243 form and sample shall then be transmitted to the Residency Office.

NOTE: Caution should be exercised by those individuals obtaining samples at the point of discharge. Be certain that the truck operator knows that you are collecting a sample. Do not place yourself in such a position that the salt is liable to be dumped upon you and always remain clear of the tailgate.

2. STOCKPILE SAMPLES - Department and Supplier

Under most conditions, when a stockpile is built, it will tend to segregate as do truck samples. To obtain a sample that will be representative of the entire stockpile, increment samples should be taken from at least three locations: top, bottom and intermediate point as illustrated in Figure 3.

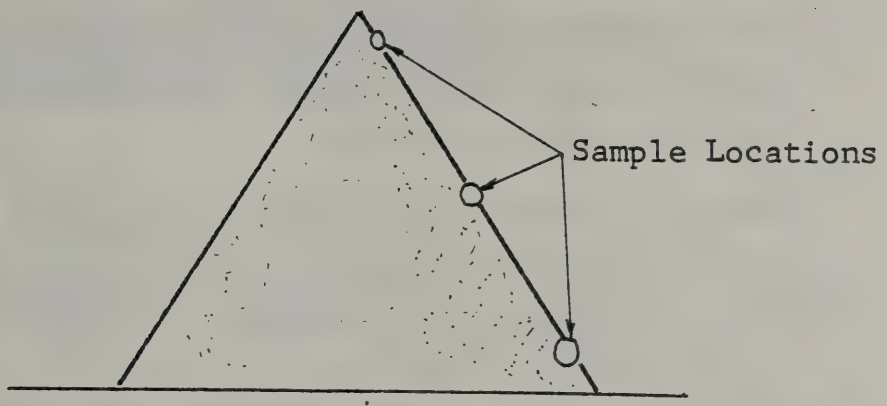


Figure 3 - Increment Sample Locations

At each sampling point, the face or surface of the pile should be exposed to a minimum depth of 1 foot. Care should be taken to insure that salt adjacent to the sampling point does not fall into the sampling area. This is best done by inserting a rigid board or other suitable device above the sampling point as illustrated in Figure 4.

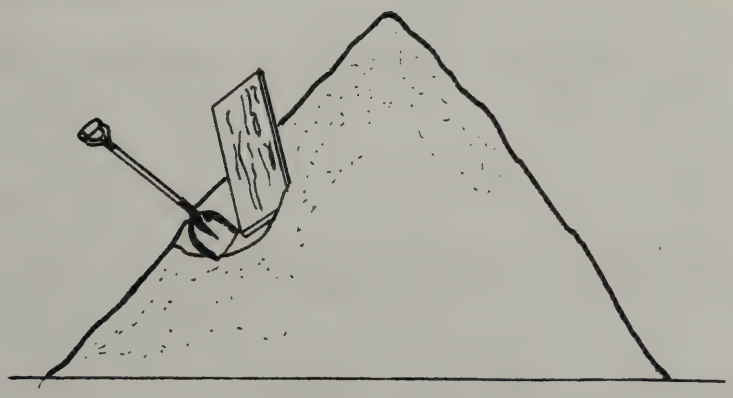


Figure 4 - Obtaining Stockpile Sample

The sample should be taken and bagged with a shovel or other suitable device as described under TRUCK SAMPLES. The total sample size for the three increment locations should approximate 5-10 pounds. The sample and salt sampling record form should be transmitted as per the procedures outlined for TRUCK SAMPLES.

NOTE: If stockpiles are of a large size, approximately 10,000+ tons, the number of locations should be increased, but the increment locations (top, middle, bottom) should remain the same.

APPENDIX C

TESTING PROCEDURE
SIEVE AND MOISTURE CONTENT ANALYSIS FOR
SODIUM CHLORIDE CRUSHED ROCK SALT, TYPE A

I. SCOPE

This method of test describes the procedure for determining the particle size distribution (gradation) by sieve analysis and the moisture content of crushed rock salt used for purposes of snow and ice removal. The method of test for sieve analysis conforms to ASTM Designation C-136 as modified for the Department's use.

II. EQUIPMENT

The following equipment will be necessary to perform both tests. Since the sample of salt can absorb or lose moisture when it is in contact with the atmosphere, it is desirable to minimize the exposure time. All necessary equipment should be in readiness prior to opening the sample container.

1. Beam Balance or Scale - 1000 gram minimum capacity, 0.10 gram graduations.

2. Sieves - the Department's standard testing sieves of the following sizes: 3/8"; No. 4; No. 8; No. 30; Pan.

3. Sieve Shaker.

4. Oven - capable of maintaining a uniform temperature between 103 and 110° C.

5. Sample Splitter - if a sample splitter is unavailable, the sample may be quartered as prescribed herein.

6. Large Pan - a pan of sufficient size to accomodate a sample weighing not less than one pound (approximately 500 grams).

7. Miscellaneous - spatulas, spoons, etc., to break-up and transfer samples.

III. TEST SAMPLE PREPARATION

The salt sample, received in its container, shall be prepared for both the sieve analysis and moisture content determinations in the following manner. Approximately one (1) to two (2) pounds (450-900 grams) of salt will be used for the sieve analysis and moisture test. Be certain that all equipment is available, prior to opening the sample container and that the mixing, splitting and weighing, as described below, is performed as rapidly as possible.

1. Open the sample container and thoroughly mix the entire sample on a clean impervious surface.

2. Using a sample splitter, split the mixed sample into two (2) fractions. Each of these fractions shall be split again. If the desired sample size (1-2 lbs.) has been obtained, one fraction may be tested or two quarter fractions recombined and tested in order to obtain the correct sample size.

   Note 1. If after splitting the sample twice, the resulting sample size is still too large, continue the splitting process until the correct size is obtained.

   Note 2. If a sample splitter is not available, the following method shall be used: Distribute the sample as uniformly as possible over a large smooth surface, making a wide flat pile that is reasonably uniform in thickness and distribution of particle sizes. Divide the sample into equal quarters with a trowel or straight piece of sheet

metal. Discard two diametrically opposite quarters and combine the remaining quarters taking care to include the dust and fines with each quarter. If necessary, this procedure is repeated until the sample size has been reduced sufficiently.

IV. TEST PROCEDURE

1. MOISTURE CONTENT

a. Immediately after the proper sample size has been obtained, the sample shall be transferred to a pan and carefully weighed. The sample shall then be placed in an oven and dried to a constant weight at a temperature between 103 and 110° C for a minimum of three (3) hours. If the sample is particularly wet, it may be stirred occasionally to prevent a hard crust from forming and to facilitate the drying process. If after three hours in the oven the sample has not completely dried the drying procedure should continue.

After the sample has been thoroughly dried, it shall be removed from the oven, allowed to cool, and be carefully weighed.

b. Calculating Moisture Content

The moisture content shall be computed to the nearest tenth of a percent (0.1%) by using the following formula:

$$\text{Moisture Content (\%)} = \frac{C}{A} \times 100$$

A = Initial weight of sample (Wet Weight)
B = Weight after drying (DryWeight)
C = A-B (Wet Weight-Dry Weight)

Note: Reporting to the nearest 0.1 percent shall be performed by "rounding-off" as per ASTM- Designation E-29. In general "rounding-off" shall be done as follows:

1. When the figure beyond the last place to be retained is less than 5, retain the last figure.

   Examples: % Moisture = 2.63 --- Report
   % Moisture = 2.6

2. When the figure beyond the last place is greater than 5, increase by 1, the last figure.

   Examples: % Moisture = 2.67 --- Report
   % Moisture = 2.7

3. When the figure beyond the last place to be retained is 5, and there are no figures beyond this 5, or only zeros, increase by 1 the last figure if odd, leave the last figure unchanged if even. Increase by 1, the last figure, if there are figures beyond this 5.

   Examples:

   % Moisture = 2.350 : Report - % Moisture = 2.4
   % Moisture = 2.450 : Report - % Moisture = 2.4
   % Moisture = 2.352 : Report - % Moisture = 2.4
   % Moisture = 2.452 : Report - % Moisture = 2.5

2. SIEVE ANALYSIS

   a. As soon as the moisture content test has been completed the sieve analysis shall be performed. In preparation for this test, any lumps in the dried sample shall be broken up in the pan, prior to sieving. Caution should be exercised so as

not to "crush" the salt sample. The sieves shall be nested, in order of decreasing size (3/8"-No.4-No.8-No.30 and pan) from the top to bottom. Transfer the dried sample from the pan and place on the top (3/8") sieve. Agitate the nested sieves by hand or mechanical apparatus for a minimum of ten minutes.

Note: Care should be taken so as not to overload the sieves. At the completion of the sieving operation the fraction of the sample retained on any particular sieve should not exceed 4 grams per square inch of sieving surface. This figure (4 g/in^2) approximates 200 grams on an 8 inch diameter sieve.

After completion of the sieving operation, carefully weigh the material retained on each sieve and in the pan.

b. Reporting Sieve Analysis Results

1. The individual percent retained on each sieve shall then be calculated and reported to the nearest tenth of a percent (0.1%) and rounded off using the following formula:

$$\% \text{ Retained} = \frac{\text{Weight of Material Retained on Sieve}}{\text{Total Dry, Weight of Sample}}$$

2. The cumulative percent retained is computed by adding the individual percents retained at any particular sieve (i.e. Cumulative % Retained for No. 8 Sieve = Sum of individual percents retained on No. 8, No. 4 and 3/8" sieves).

3. Cumulative % passing = 100 - Cumulative % Retained.

4. Rounding % passing is done in accordance with ASTM Designation E-29 and as per the examples given under Moisture Content. Rounded % Passing shall be to the nearest 1.0%.

5. % Out of Specification is based on specification range using Rounded % Passing values to the nearest 1.0%.

Note: See Appendix A, for examples of calculations and reporting information on the SALT SAMPLING RECORD.

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